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ABSTRACT

This study investigated the effectiveness of the SQ3R study skill technique in the science education of sixth grade students. Subjects, 30 students in a control group and 19 students in the experimental group comprising two separate classrooms in a culturally mixed urban elementary school, used the science text "Gateways to Science" and completed publisher-made tests for three of the chapters. Subjects in the experimental group received instruction in the SQ3R technique in conjunction with the science unit while the control group received no training in study skills. Results of the three chapter tests indicated that subjects in the experimental group received significantly higher grades on the tests than subjects in the control group. (Two tables of data are included; 26 references and two tables of data are attached.) (RS)

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SQ3R:
A MUST FOR TEACHING SCIENCE CONCEPTS TO SIXTH GRADERS?

by

Ann Gale Paporello

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Presented in partial fulfillment of the requirements
for the Master of Arts Degree
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ABSTRACT

The purpose of this study was to determine the value of teaching SQ3R, a specific study skill technique, to a class of sixth grade students in conjunction with their science curriculum. Three specific chapters were selected from the science text, Gateways to Science, to conduct the experiment. One class of students was taught without the use of a study skill technique, while the experimental sample was taught the same chapters along with the use of the SQ3R study strategy. The two classes were initially tested to establish the fact that they were indeed matched samples.

The results (scores achieved on textbook tests) reflected the fact that teaching the students these science chapters utilizing the SQ3R study strategy did make a significant difference in the scores achieved by the experimental sample.

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Dechant and Smith (1977) indicate that the greatest challenge facing teachers today is the improvement of classroom procedures in the light of present knowledge. Heller (1986) states that teaching students to become independent learners is the primary goal of the school. As instructors, we must be concerned with the students' metacognition or how they know what they know. This diagnostic information becomes useful l helping students become independent in the learning process.

Berkowitz (1986) and Graham (1982) cite the fact that teachers and researchers agree that students in the middle grades display difficulty reading and recalling information in their content area texts. As texts become a vital avenue of learning in the upper grades, it is important for middle-grade students to learn to read and to study more effectively from these books. An effective study skill technique, notes Graham (1982), provides the student with the tool needed to comprehend, learn, and recall ideas presented in their texts. Shilling (1984) recommends that study skills be taught before seventh grade. Students need to become more adept at understanding and using specific techniques in order to be more confident about their work.

A well planned study guide provides the student with a method for attacking a lesson to be learned. It provides the student with a structured approach for digesting the material and an increase in time spent on the reading task.

"The value of the study guide is that it teaches

students how to learn. It sets a purpose for the reading, allows students to relate to the material and helps them evaluate the information" (McClain, 1981).

Orlando (1980) suggested that if a specific study technique like SQ3R is to be successfully incorporated by the students into their studying, the students needed to be provided with detailed instruction in the steps of the technique and to be monitored in the use of the method.

Graham (1982) points out that the strength of the SQ3R method is in its emphasis on practice and repetition. The student must read a selection thoroughly and purposefully. This goal is outlined in Thorndike's Law of Exercise (Dechant and Smith, 1977) where he stresses the need for practice in the learning process.

Putnam (1989) notes that attitude, motive, purpose, self-esteem and confidence interacting simultaneously form the basis of the reading program. The study skill methods provide a purpose for learning and motivate the students to learn. The results of tests on well-mastered information afford the students confidence, self-esteem, and a better attitude about themselves and the learning process.

HYPOTHESIS

While much opinion is reflected in the above, scant research evidence is offered to support the utilization of SQ3R with specific populations or grade levels. To provide evidence on this question, the researcher sought to

determine if the use of this study skill as used by sixth grade students promoted greater academic success in science, and further sought to determine if there was a significant difference between the employment of a specific study skill as opposed to the non-use of a study skill. To offer further support for the need for teaching the children to become independent in the learning process, a study was conducted to determine the differences, if any, in academic achievement existed between two samples. It was hypothesized that the academic achievement of a class of sixth grade students who demonstrated the ability to use SQ3R in conjunction with their science text would not be significantly higher than the academic achievement of a class of sixth graders who did not utilize a specific study skill technique.

DEFINITIONS

Study Skill - a strategy used to facilitate the critical process of learning.

Strategy - systematic or structured behavior.

SQ3R - A specific study skill technique developed by Francis P. Robinson in 1946 utilizing the format of surveying, questioning, reading, reciting, and reviewing to learn a body of information.

Survey - taking a broad overview of the reading by looking at the title, headings, words in boldface or italics, summaries, and review questions.

Question - formulating questions by turning each

heading into a question and by checking review questions in the book.

Recite - reading the questions about the selections and providing answers in your own words, first orally, then in writing.

Review - going over the questions without consulting your answers and checking your work to determine accuracy.

PROCEDURES

The study was comprised of two sixth grade classes of average ability in the content area of science. Both groups were similar in terms of educational program and both were culturally mixed from the same school in an urban district.

One classroom was the control sample (30 students) and one the experimental sample (19 students). The classes utilized the text, Gateways to Science, published by McGraw-Hill (1985). Students' progress was determined by the use of publisher made textbook exams for each of the three chapters taught. Therefore, it was assumed that teachers' grades were valid indicators of student achievement in content area subjects.

One instructor taught the experimental sample the elements of the SQ3R study skill technique in conjunction with the science unit. Another instructor taught the control sample without the use of any additional study skills to assist them in mastering the content material. At the onset of the experiment, both groups were considered for

similarity of ability by comparing their reading scores on the reading pre-test. Both groups were then tested at the conclusion of each chapter on the same publisher produced tests from the science text. The results from 3 chapters were compiled, and mean differences between the samples were examined to determine results as related to the hypothesis.

RESULTS

As noted in Table I, the experimental and control samples were essentially matched samples (see Tables III and IV in Appendix). The t test indicated that there was no significant difference between the samples in reading ability according to the pretest on vocabulary and comprehension which was administered at the onset of the study.

Table I

t-Test of Reading Scores for Experimental and Control Sample Means

Group	N	Mean of Pre-test Reading Scores	Standard Deviation	t
Control	30	65.63	18.64	0.85
Experimental	19	69.74	11.96	

However, Table II, which reflected the results

Table II
t-Test of Publisher Produced Science Tests

Group	N	Mean of Post-test Science Tests	Standard Deviation	t
Control	30	62.17	15.36	3.76
Experimental	19	78.40	19.35	

after the experimental treatment was administered, showed a marked difference between the experimental and control samples. As noted in this table, there was a 16 point mean difference between the two participating samples. The results indicated that the use of SQ3R taught in conjunction with the science chapters proved to enhance the academic ability of the experimental sample on publisher produced tests.

CONCLUSIONS and IMPLICATIONS

This research project attempted to determine whether the academic achievement of a class of sixth grade students who demonstrated the ability to employ SQ3R would be significantly higher than the academic achievement of a class of sixth graders who did not utilize a specific study skill technique in conjunction with their science chapters. The results of the study (Table II) noted a significant mean difference between the two samples in favor of the sample utilizing the SQ3R study skill strategy.

The investigation was subject to several limitations. The time frame restriction imposed (November to January) limited the population which was investigated to 49 students

(30 in the control sample and 19 in the experimental sample). The samples were comprised of sixth grade students from two classes in an urban school district studying in the academic area of science. Therefore, any conclusions reached should not be extended beyond this study. Replication with other and similar samples is suggested to confirm the tentative conclusion that the use of a study technique is very helpful in learning science material.

Even though this study did have several limitations, there were implications for further research. The span of time was relatively limited and could possibly be extended in a future project. A larger population could be used, sampling several classes in several schools within one district. Using several different school districts would afford an even more varied population for the study. In addition, various grade levels, as well as other content area subjects, could be sampled and compared to offer further empirical evidence to support the utilization of the SQ3R study skill strategy.

Teaching students to utilize a study skill technique in conjunction with content area subjects did have a positive effect according to the results cited here. Educators, therefore, should be aware of the value of training their students in this technique and of its ultimate effect on the academic achievement of students.

LEARNING STRATEGIES: RESEARCH

The need for utilizing a specific study skill technique in conjunction with content area learning has been of concern to educators as reported in the existent literature as early as 1942 with little effect on practice by teachers. Research has been conducted which supports the need to provide training in the use of study skills within the specific content area being taught.

For example, Gusset (1986) examined the relationship of specific reading performance objectives and science achievement in 157 fifth through eighth grade students. It was noted that 26 of the 38 reading performance measures correlated highly with science achievement. Cassidy (1977) further indicated that reading is an essential part of every subject area from the primary grades through high school and college. Reading within different subject areas required different kinds of approaches and skills. These approaches were taught to teachers at inservice and summer sessions. The sessions were devoted to identifying the reading skills particular to a specific subject and to developing activities to reinforce those skills.

Eeds (1981) reviewed Dolores Durkin's recommendations for research-based strategies for teaching comprehension. Durkin expressed the need to teach better comprehension by asking questions that go beyond recall. Much research indicated that high level questioning was of most benefit to poor comprehenders who have minimal decoding and vocabulary problems. More recall occurred when students asked themselves questions about the material and then read to

answer the questions than if they just used ordinary study techniques. Self-generated questions proved most effective with students who had low verbal ability.

Andre and Anderson (1978-1979) organized two studies which attempted to determine whether or not generating good comprehension questions while studying prose material was indeed an effective study technique. Their studies determined that question-generating strategies were most beneficial to the test performance of low verbal ability students more than the performance of high ability students. Furthermore, the probability of correctly answering a test question was highly increased when a good comprehension question had been generated for that particular topic during the study period. The percentage of good comprehension questions was a significant predictor of achievement. Determining the main ideas and transforming them into questions involved a deeper semantic analysis of the text than simply reading and rereading, and resulted in superior performance. Moreover, students, they found, could be trained to produce main idea questions which resulted in their increased ability to raise such questions on their own and ultimately increased their score. Allison and Shrigley (1986) further supported the fact that teacher modeling dominated the research on training students to ask questions.

Stoodt's and Balbo's (1979) study integrated study skills and content area information in a twelfth grade economics class. Lesson plans for the experimental group

were devised by both the economics and the reading teacher, whereas, the control groups lessons were planned only by the economics teacher. A pretest and posttest were administered to each of the groups to insure their equivalency. The test taken from Robinson's Teaching Reading and Study Strategies included five areas: outlining, locating information, vocabulary in context, chart interpretation, and study reading. The results of their study indicated tha integrating study skills with content created a significant difference between pretest and posttest scores of the experimental group. Results produced by the control group reflected no significant difference between pretest and posttest scores. In conclusion, Stoodt and Balbo recommended integrating study skills instruction with content area learning for greater mastery in both of these areas. Students who were not taught study skills did not appear to identify and learn these skills on their own.

Chastain and Thurber(1989) examined the performance of 24 general psychology students and concluded that the use of SQ3R enhanced the comprehension of material presented in this field. Differences in study time, interest and motivation, practice, and anxiety were eliminated as sources of the effects. Performance on tests composed of recall or conceptual items for each chapter was significantly better when SQ3R was employed.

McPhail (1978) presented results of studies conducted over a three year period in the Philadelphia area at health professions schools. Evidence suggested that SAEP (Summer

Academic Enrichment Program), SARP (Summer Academic Reinforcement Program), and SOAR (Sumer Orientation and Retention Program) program participants were, in fact, successfully completing the training systems at the respective schools. The importance of teaching students to utilize efficient reading/study techniques in reading materials actually used in their coursework cannot be overemphasized. Comparis ns of pretest and posttest performance on the reading/study skills inventories indicated improvement in reading/study skills efficiency at the 0.01 level of significance. These results were consistent for all three summer programs across all three years. The following techniques appeared to be utilized most often by students in the basic science courses: previewing, note-taking, reading note-taking material, increasing concentration and motivation, organizing study time, and mastering textbook material.

Slater, Graves, and Piche (1985) examined the effects of providing subjects with prior information about the organization of expository passages. Their sample consisted of 224 high-, middle-, and low-ability ninth grade students randomly assigned to one of four prereading treatments: structural organizer with outline grid, structural organizer without outline grid, control condition with note-taking, or control condition without note-taking. Results of the study indicated that students were likely to comprehend and recall more from the text if they received well-defined information on the organization of a passage before they read it.

Producing an outline of the text further enhanced the students ability to comprehend and recall a passage, and note-taking markedly improved students' comprehension and recall.

Kamm (1978) reported on a five-year study conducted in 80 elementary schools in grades Kindergarten through sixth which concluded that a skill-centered approach to reading afforded a practi al and viable approach to teaching children how to read. A particular area of focus cited was study skills. Through direct instruction in this vital area of reading and comprehending, the performance of students in grade 4 and grade 6 improved notably. The Wisconsin school district that participated in the study directed its teachers to provide instruction in study skills on a consistent basis to further raise student ability levels in this vital area of learning.

Michele L. Simpson (1986) reported on her four year use of a system developed and taught to her students. PORPE involved predicting, organizing, rehearsing, practicing and evaluating the material to be learned. PORPE involved the students actively in defining tasks, setting purposes, identifying key ideas, reorganizing information into their own words and schema, self questioning and self testing, much as they do in the SQ3R study skill method. PORPE, like the SQ3R method, provided a systematic process of study.

Palincsar and Brown's (1984) classroom research showed that low performers could improve their reading comprehension and their independent learning. When students

were given specific steps in how to perform a process and received extensive modeling and repeated practice in concrete, related contexts, they were able to learn how to behave as effective and mature readers. The researchers modeled summarizing, questioning, clarifying and predicting techniques for junior high remedial readers to improve comprehension. Participants demonstrated significant gains in their science and social studies classwork.

Karahalios, Tonjes, and Towner (1979) created a study designed to assess the results of prereading experiences of 76 seventh grade students in a junior high school in a small, rural community. According to their statistical results, they contended that the amount of prereading instruction provided was positively related to the students' performance on the posttest administered.

Tadlock (1978) noted the need to teach students why the SQ3R method worked. This knowledge provided students with an understanding and a belief in the technique, which then encouraged them to utilize it in their studies. This study technique provided compensation for inherent deficiencies in the formation processing system, forcing readers to use their own processing systems in a productive manner. The review component of the SQ3R method further counteracted the forgetting process which took place shortly after the learning task was completed.

Jacobowitz (1988) emphasized and outlined the need to teach the students the relevancy of the different components of the SQ3R study skill technique. Students needed to

understand the theoretical basis of the strategy - why it worked - in order to utilize it independently. Her collegiate students consistently rated the SQ3R procedure above others presented during the semester. Although Graham (1982) did not particularly favor the use of SQ3R above other study methods, he did concede its applicability as a convenient tool for teaching students basic learning principles for textual study.

Orlando (1980) contended that no matter how good a study skill procedure seemed, it would be of little value unless students used it. He, therefore, outlined a procedure for training and then applying the use of a modified version of the SQ3R study skill technique which he utilized over the period of an entire school semester. The strategy provided for mastery of the individual steps of the process and for utilization of the technique within the content area text for the course.

As McClain (1981) summed up, a study guide taught the students how to learn, set a purpose for the reading, allowed the students to relate to the material, and helped them evaluate the information. Haggard (1984) pointed out that the interaction of content and process, which took place in the use of study skills, stimulated a great deal of critical and evaluative thinking. Students came to associate reading and learning with thinking and reasoning and further developed the metacognitive skills necessary for monitoring their own progress. Gunston-Parks and Thomas (1986) concluded that through writing/study strategies, the

learner was naturally a more involved, active participant in the educational process. These study skills became an intrinsic means to the ultimately desired end: effective and efficient learning.

Although SQ3R has been heralded as one of the most popular study methods with numerous articles being written about it, careful analysis of the literature revealed that most articles were based mainly on favorable opinion. As indicated at the onset, there is a need for further research to determine if SQ3R is indeed a superior reading/study technique, and if this strategy can successfully train students to study more effectively.

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APPENDIX

Table III

Pre and Post Test Scores for Control Group

Student Identification Number	Pre-Test Score	Student Identification Number	Post-Test Score
1	96	1	86
14	93	12	85
6	93	25	80
27	85	20	80
8	84	16	78
25	82	6	77
11	82	2	75
26	77	26	74
16	76	21	74
10	76	23	71
20	75	13	71
2	74	3	68
28	73	14	68
5	71	8	68
24	67	17	66
17	66	15	66
18	63	29	64
4	63	22	62
22	62	27	58
3	60	9	57
15	58	28	53
7	56	30	53
29	53	19	49
19	53	4	46
23	48	7	44
21	44	11	44
30	43	10	44
13	32	5	36
12	31	18	35
9	23	4	33

Table IV

Pre and Post Test Scores for Experimental Group

Student Identification Number	Pre-Test Score	Student Identification Number	Post-Test Score
44	85	38	98
38	84	48	93
31	82	44	90
48	80	35	88
45	79	45	88
43	76	43	87
47	75	46	87
49	75	49	84
34	73	36	83
32	72	31	81
41	72	32	81
46	67	34	81
35	66	37	80
33	65	39	78
36	63	42	69
42	63	33	68
37	60	47	64
39	52	40	44
40	36	41	44